

**CLAIMS:**

1. At least one protein,
  - a) which has one of the following sequences as an active, mature protein:  
SEQ ID NO: 1 (SAP-2); or
  - b) which has allelic modifications of one of the amino acid sequences that are mentioned above under a) as an active, mature protein, whereby at least one amino acid of the amino acid sequence is substituted, deleted, or inserted, without in this case significantly affecting the activity of the active protein,  
  
or
  - c) which has post-translational modifications of one of the sequences under a) and b) as an active, mature protein, and these modifications do not significantly affect the activity of the active protein.
2. At least one protein,
  - a') which as an active, mature protein has the N-terminus of one of the following sequences:  
SEQ ID NO: 2 (SAP-3); or
  - b') which has allelic modifications of one of the amino acid sequences that are mentioned above under a') as an active, mature protein, whereby at least one amino acid of the amino acid sequence is substituted, deleted, or inserted, without in this case significantly affecting the activity of the active protein,  
  
or
  - c') which has post-translational modifications of one of the sequences under a') and b') as an active, mature protein, and these modifications do not significantly affect the activity of the active protein.
3. Protein according to claim 2, having an antimicrobial or antibiotic action and having a mobility of 6 kDa in the SDS-gel electrophoresis.

4. Protein, consisting of a signal sequence and a mature protein according to claim 1,  
d) whereby the protein consists one of the following sequences:  
(i) SEQ ID NO: 3 (PreSAP-2);  
or  
e) whereby the protein has allelic modifications of one of the amino acid sequences that are mentioned above under d), whereby at least one amino acid of the amino acid sequence is substituted, deleted or inserted, without in this case significantly affecting the activity of the mature active protein,  
or  
f) whereby the protein has post-translational modifications of one of the sequences under d) and e), which do not significantly affect the activity of the active mature protein.
5. Protein according to one of the preceding claims, which is a recombinant protein.
6. cDNA or DNA,  
aa) whereby the cDNA or DNA codes one of the following amino acid sequences:  
(i) SEQ ID NO: 1; or  
(ii) a protein with the N-terminus according to SEQ ID NO:2;  
or  
bb) whereby the cDNA or DNA codes allelic modifications of one of the amino acid sequences under aa), in which at least one amino acid of the amino acid sequence is substituted, deleted or inserted, without in this case significantly affecting the activity of the active protein.
7. cDNA or DNA,  
cc) whereby the cDNA or DNA has one of the following nucleotide sequences:  
(i) SEQ ID NO: 5; (cDNA-SAP-2)

(ii) SEQ ID NO: 6 for the N-terminus of the protein; (cDNA-SAP-3);

or

dd) whereby the cDNA or DNA has an allelic modification of one of the nucleotide sequences under cc), whereby at least one nucleotide is substituted, deleted or inserted, without in this case significantly affecting the activity of the protein, which is coded by the allelic modification of the nucleotide sequence under cc).

8. cDNA or DNA,

ee) whereby the cDNA or DNA has one of the following nucleotide sequences:

(i) SEQ ID NO: 7; (cDNA-PreSAP-2) or

(ii) sequence encoding the N-terminus with SEQ ID NO: 8 (cDNA-PreSAP-3),

or

ff) whereby the cDNA or DNA has an allelic modification of one of the nucleotide sequences under ee), whereby at least one nucleotide is substituted, deleted or inserted; without in this case significantly affecting the activity of the protein, which is coded by the allelic modification of the nucleotide sequence under ee).

9. Vector, which contains a cDNA or DNA according to one of the claims 6 to 8, also a suitable promoter and optionally a suitable enhancer.

10. Eukaryotic or prokaryotic host cell transformed with a vector according to claim 9.

11. Process for the production of a protein according to any one of claims 1 to 5 by use of a host cell according to claim 10,

cultivation of the host cell,

accumulation of the protein, and

purification of the protein.

12. Process for synthesizing of a protein according to any one of claims 1 to 5 wherein the proteins are synthesized according to the solid-phase method or the liquid-phase method.

13. Binding molecules, single chain proteins, antibodies, or fragments of antibodies that specifically detect domains on the mature protein according to one of the preceding claims 1 to 3.
14. Process for the purification of proteins according to any one of claims 1 to 5, whereby the process consists of the following steps:
  - (ii) Extraction of proteins from natural human epithelial cells, transfected cells or skin scales or cell cultures, which were exposed to microorganisms;
  - (iii) Application of the extract on an affinity column with subsequent Reversed Phase HPLC and elution via a salt gradient, with acids or organic eluents; or
  - (iii) Application of the extract on an HPLC column and elution with salts.
15. Proteins according to any one of claims 1 to 5, 11, 12 and 14 as pharmaceutical substances, optionally in combination with pharmaceutically compatible vehicles or additives.
16. Proteins according to claim 15 for the treatment and prevention of infections of microorganisms.
17. Protein according to claim 15 or 16 for topical application.
18. Pharmaceutical composition, which contains one of the proteins or a mixture of the proteins according to any one of claims 1 to 5, in the presence of pharmaceutically compatible and acceptable compounds and vehicles.
19. Bandage
  - (i) with at least one protein according to any one of the preceding claims 1 to 5; or
  - (ii) with syngeneic or allogeneic human cells that are transfected with DNA or cDNA according to any one of claims 6 to 8.
20. Use of at least one protein according to any one of the preceding claims 1 to 5 for the production of antibodies or fragments thereof.

21. Use of an antibody or fragment thereof according to claim 20 as a diagnostic agent.

## (1) GENERAL INFORMATION:

## (i) APPLICANT:

|               |                             |
|---------------|-----------------------------|
| NAME:         | Schering Aktiengesellschaft |
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(ii) TITLE OF THE APPLICATION: Human Antibiotic Proteins

(iii) NUMBER OF SEQUENCES: 8

## (iv) COMPUTER-LEGIBLE FORM:

|                   |                   |
|-------------------|-------------------|
| TYPE OF MEDIUM:   | Floppy disk       |
| COMPUTER:         | IBM/PC compatible |
| OPERATING SYSTEM: | OC-DOS/MS-DOS     |

## (2) INFORMATION REGARDING THE SEQUENCES

SEQ ID NO: 1

TYPE OF SEQUENCE: Amino acid sequence

SEQUENCE LENGTH: 128 amino acids

TYPE OF MOLECULE: mature SAP-2 protein

ORIGIN:                   horny scales of psoriasis patients

PROPERTIES: antibiotic protein

[illegible]

SEQ ID NO: 2

TYPE OF SEQUENCE: Amino acid sequence  
 SEQUENCE LENGTH: 33 amino acids  
 TYPE OF MOLECULE: N-terminus of mature SAP-3 protein  
 ORIGIN: horny scales of psoriasis patients  
 PROPERTIES: as a mature protein, function of an antibiotic protein

```

      Gly Ile Ile Asn Thr Leu Gln Lys Tyr Tyr Cys Arg Val Arg Gly
40      5      10      15

      Gly Arg Cys Ala Val Leu Ser Cys Leu Pro Lys Glu Glu Gln Ile
      20      25      30

45  Gly Lys
      32
  
```



SEQ ID NO: 3

TYPE OF SEQUENCE: Amino acid sequence

SEQUENCE LENGTH: 156 amino acids

TYPE OF MOLECULE: preprotein SAP-2, protein with signal sequence

ORIGIN: horny scales of psoriasis patients

PROPERTIES: antibiotic protein

```

Met Ala Pro Ala Arg Ala Gly Phe Cys Pro Leu Leu Leu Leu Leu
      -25              -20              -15

Leu Leu Gly Leu Trp Val Ala Glu Ile Pro Val Ser Ala Lys Pro
      -10              -5              -1  1

Lys Gly Met Thr Ser Ser Gln Trp Phe Lys Ile Gln His Met Gln
      5              10              15

Pro Ser Pro Gln Ala Cys Asn Ser Ala Met Lys Asn Ile Asn Lys
      20              25              30

His Thr Lys Arg Cys Lys Asp Leu Asn Thr Phe Leu His Glu Pro
      35              40              45

Phe Ser Ser Val Ala Ala Thr Cys Gln Thr Pro Lys Ile Ala Cys
      50              55              60

Lys Asn Gly Asp Lys Asn Cys His Gln Ser His Gly Pro Val Ser
      65              70              75

Leu Thr Met Cys Lys Leu Thr Ser Gly Lys Tyr Pro Asn Cys Arg
      80              85              90

Tyr Lys Glu Lys Arg Gln Asn Lys Ser Tyr Val Val Ala Cys Lys
      95              100             105

Pro Pro Gln Lys Lys Asp Ser Gln Gln Phe His Leu Val Pro Val
      110             115             120

His Leu Asp Arg Val Leu
      125

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SEQ ID NO: 4

TYPE OF SEQUENCE: Amino acid sequence

SEQUENCE LENGTH: 61 amino acids

TYPE OF MOLECULE: N-terminus of mature protein SAP-3 with signal sequence

ORIGIN:                   horny scales of psoriasis patients

PROPERTIES: as a mature protein, function of an antibiotic protein

Met Arg Val Leu Tyr Leu Leu Phe Ser Phe Leu Phe Ile Phe Leu  
-23 -20 -15 -10

Met Pro Leu Pro Gly Val Phe Gly Gly Ile Ile Asn Thr Leu Gln  
-5 -1 1 5

Lys Tyr Tyr Cys Arg Val Arg Gly Gly Arg Cys Ala Val Leu Ser  
10 15 20

Cys Leu Pro Lys Glu Glu Gln Ile Gly Lys Thr  
25 30 33

SEQ ID NO: 5

TYPE OF SEQUENCE: Nucleotide sequence

SEQUENCE LENGTH: 384 nucleotides

TYPE OF MOLECULE: cDNA that codes mature SAP-2

ORIGIN: horny scales of psoriasis patients

PROPERTIES: cDNA that codes antibiotic protein

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AAG CCC AAG GGC ATG ACC TCA TCA CAG TGG TTT AAA ATT CAG CAC 045
ATG CAG CCC AGC CCT CAA GCA TGC AAC TCA GCC ATG AAA AAC ATT 090
5 AAC AAG CAC ACA AAA CGG TGC AAA GAC CTC AAC ACC TTC CTG CAC 135
GAG CCT TTC TCC AGT GTG GCC GCC ACC TGC CAG ACC CCC AAA ATA 180
10 GCC TGC AAG AAT GGC GAT AAA AAC TGC CAC CAG AGC CAC GGG CCC 225
GTG TCC CTG ACC ATG TGT AAG CTC ACC TCA GGG AAG TAT CCG AAC 270
15 TGC AGG TAC AAA GAG AAG CGA CAG AAC AAG TCT TAC GTA GTG GCC 315
TGT AAG CCT CCC CAG AAA AAG GAC TCT CAG CAA TTC CAC CTG GTT 360
20 CCT GTA CAC TTG GAC AGA GTC CTT
384

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SEQ ID NO: 6

TYPE OF SEQUENCE: Nucleotide sequence

SEQUENCE LENGTH: 99 nucleotides

TYPE OF MOLECULE: cDNA encoding N-terminus of mature SAP-3 protein

ORIGIN: horny scales of psoriasis patients

PROPERTIES: cDNA that codes antibiotic protein

```
GGA ATA ATA AAT ACA CTA CAG AAG TAC TAC TGC CGA GTG CGA GGA 045
30 GGA CGA TGC GCA GTA CTA TCA TGC CTA CCA AAG GAA GAA CAA ATT 090
GGG AAA ACC 099
```

SEQ ID NO: 7

TYPE OF SEQUENCE: Nucleotide sequence

SEQUENCE LENGTH: 468 nucleotides

TYPE OF MOLECULE: cDNA that codes preprotein for SAP-2,  
SAP-2 with signal sequence

ORIGIN: horny scales of psoriasis patients

PROPERTIES: cDNA that codes antibiotic protein

|    |   |     |
|----|---|-----|
| 40 | ATG GCA CCG GCC AGA GCA GGA TTC TGC CCC CTT CTG CTG CTT CTG | 045 |
|    | CTG CTG GGG CTG TGG GTG GCA GAG ATC CCA GTC AGT GCC AAG CCC | 090 |
| 45 | AAG GGC ATG ACC TCA TCA CAG TGG TTT AAA ATT CAG CAC ATG CAG | 135 |
|    | CCC AGC CCT CAA GCA TGC AAC TCA GCC ATG AAA AAC ATT AAC AAG | 180 |
| 50 | CAC ACA AAA CGG TGC AAA GAC CTC AAC ACC TTC CTG CAC GAG CCT | 225 |
|    | TTC TCC AGT GTG GCC GCC ACC TGC CAG ACC CCC AAA ATA GCC TGC | 270 |
| 55 | AAG AAT GGC GAT AAA AAC TGC CAC CAG AGC CAC GGG CCC GTG TCC | 315 |
|    | CTG ACC ATG TGT AAG CTC ACC TCA GGG AAG TAT CCG AAC TGC AGG | 360 |
|    | TAC AAA GAG AAG CGA CAG AAC AAG TCT TAC GTA GTG GCC TGT AAG | 405 |
| 60 | CCT CCC CAG AAA AAG GAC TCT CAG CAA TTC CAC CTG GTT CCT GTA | 450 |
|    | CAC TTG GAC AGA GTC CTT                                     | 468 |

SEQ ID NO: 8

|                   |   |
|-------------------|---|
| TYPE OF SEQUENCE: | Nucleotide sequence   |
| SEQUENCE LENGTH:  | 183 nucleotides   |
| TYPE OF MOLECULE: | cDNA encoding the N-terminus of<br>preprotein SAP-3 (signal sequence and mature<br>protein) |
| ORIGIN:           | horny scales of psoriasis patients  |
| PROPERTIES:       | cDNA that codes antibiotic protein  |

|   |     |
|---|-----|
| ATG AGG GTC TTG TAT CTC CTC TTC TCG GGC CTC TTC ATA TTC CTG | 045 |
| GGA ATA ATA AAT ACA CTA CAG AAG TAC TAC TGC CGA GTG CGA GGA | 090 |
| GGA CGA TGC GCA GTA CTA TCA TGC CTA CCA AAG GAA GAA CAA ATT | 135 |
| GGG AAA ACC   | 144 |